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RELATIONSHIP BETWEEN PHYSICAL AND INORGANIC CONTENTS IN SOIL IN BALCO AREA OF KORBA CITY

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ABSTRACT

This study aims to investigate the correlation matrix of various physio-chemical parameters of soil in the Balco region of Korba. The physio-chemical parameters under scrutiny encompass a broad spectrum, including but not limited to, pH, organic matter content, moisture content, texture, nutrient levels, and heavy metal concentrations. As a whole, it was concluded that the correlations in between physical and chemical parameter had the variation in the obtained value of correlation among parameter together . The study revealed the strong to low and positive to negative correlations together in between selected parameters to detect in the soil of Balco area of Korba city

Keyword: Soil, Balco, Metalic Ions, organic contents, physical parameter,

1. INTRODUCTION

Soil formation is complex and long time taking process. 100 -10000 years can be taken to create one inch of Topsoil. It is driven by many factors such as climate, topography, living organisms and the type of parent material. Soil can be divided into three horizontal layers. The top layer consists of mostly organic matter and biological activities. The middle layer is the zone of maximum material accumulation and the bottom is mainly the parental material but slightly altered (Mico, et.al.,2006).

Moisture: - The water that is eliminated by moderate heating or extracted using solvents is Hygroscopic water. "Air dried" Soil contains varying amounts of water which depend in particular on the nature of secondary mineral and external forces.By convention the term "Moisture" is considered to be unequivocal. After drying the soil at 105^{o}C, moisture of soil is gravimetrically measured. This temperature is sufficient to eliminate "Free" forms of water. This temperature does not loss of organic matter and unstable salt (Garg, 2002).

Electrical Conductivity: - Soils differ in their salt content. The water-soluble salts in soils consist of various cations and anions. The salts that generally accumulate in soils are primarily composed of CI^{-} and SO_4^{--} of Ca^{++}, Mg^{++} and Na^{+} with small amount of Co_3^{--}, HCO_3^{-}, NH_4^{+} etc.

pH :- The term pH is suggested by Sorenson (1909) to explain the hydrogen ion activity of very dilute solution and is derived from French word Poirier hydrogen means power of hydrogen.[31] pH is a measure of acidity or alkalinity of the soil it is expressed as reciprocal of logarithm of hydrogen ion concentration of the soil solution.

T.D.S.:- Total dissolved solid is measured the dissolved inorganic and organic ionic compounds. The sources of TDS are agricultural runoff, domestic sewage, industrial effluents and weathering of soil and minerals etc. The high value of TDS change the taste of water, polatability and highly adverse effect on human being.

Soil Organic Matter :- Organic matter play an important role in the physical, chemical and biological properties of soil. In the fundamental processes of evolution mineralization allow the transformation of organic residue into inorganic compounds in the soil, Atmosphere and Hydrosphere. Then these are usable by flora and by micro-organism. Immobilization is the transformation of organic matter into more stable organic and organo - mineral compounds(Garg, 2002)..

Total carbon content: - Carbon occurs in the soil in the element form of Coal, graphite's, in the inorganic forms of carbonate, hydrogen carbonate and carbon dioxide and organically as plant and as the more resistant humus. For the analysis of total carbon, the element convert completely into carbon dioxide which is then determined gravimetrically or volumetrically. Oxidation is achieved by combustion and all forms of carbon can be included (Fernandez, and Sanchez, 1990).

Nitrogen :- Nitrogen Phosphorous and Potassium(NPK) are the three most important soil nutrients required for plant growth. It is principal element required by all crops. It is taken up by crops in the form of NH_3 and NH_4. (Diacono, and Montemurro, 2010) plant growth is limited by nitrogen more than by any other element; All the important nitrogen changes that occur in soils are due to microbial activity, itself strongly influenced by micro-climatic conditions and thus the time and nature of sampling, handling and storing of soil samples, pre-treatment and method of analysis, all affects the analytical results (Fernandez, and Sanchez, 1990).

Phosphorous: - Phosphorous is essential for early growth spoil in the plant. It promots early root formation and growth. It improves the quality of many fruits, vegetables and grain crops. Phosphorous sources include from manures, phosphate rock, chemical fertilizers and soil.

Potassium: Potassium is essential for protein synthesis and cell division. It decreases water requirement of plants and important stalk strength and resistance to loading (Mico, et.al.,2006)..

Sulphur: Sulphur is an important secondary nutrient. Its deficiency has been reported in the most parts of India. Sulphur is also deficient in soils that are sandy and those having low organic matter. Its main function is related to influencing the quantity and quality of oil in oil seed crops. (Hinesly, et.al. 1984).

Calcium: Calcium is exchangeable cation and soluble salt in soil. It is macro-nutrient element. In plants calcium is essential for the growth of root tips and tends to accumulate in leaves as calcium pectate. At least 30% of the adsorption complex of a soil must be saturated its calcium for the average crop to obtain sufficient amounts. [18]The distribution of elements Ca & Mg in the soil depends upon the nature of the soil, the parental material and the environmental conditions. Ca and Mg are found to be deficient in soil, where there is high rainfall resulting in the leaching and weathering of the soil. These soils are referred to as Laterites or acidic soils or base unsaturated soils. (Poor in bases such as Ca, Mg, Na and K. (Diacono, and Montemurro, 2010).

Magenisium :- Magnesium occurs principally in the clay minerals being common in micas vermiculites and chlorites, it sometimes occurs as the carbonate, smaller quantities are present as exchangeable ions, water soluble forms and in organic combination. In chlorites Mg occurs in the layers alternating with silicate layers and it is a common interlayer cation in vermiculites .[37] it increase Sugars, Vitamins, Starches and Inulin in root crops (Hiller and Brummer, 1997). **A deficiency** of Mg typically causes chlorosis and has been associated recent years with certain animal disorders.[33] A magnesium deficiency can be caused not only be small concentration of the nutrient in a soil but by ionic antagonism particularly in acid and potassium-rich soils. In alkali soils Mg can be deficient due to precipitation and partly through the ion effect (Fernandez, and Sanchez, 1990).

Copper It is one of the essential elements for human beings. It is found in less quantity as an essential element for organisms . Excess of Cu in human body is toxic and cause hypertension and produces pathological changes in brain tissues. Excess ingestion of Cu is responsible for specific disease of the bone (Hinesly, et.al. 1984). Copper is widely distributed in soils and minerals. One of the most important Copper mineral is Chalcocite Cu_2S and another is Chalcopyrities $CuFeS_2$. As a plant nutrient Copper occurs in the enzyme Polyphenol oxidase, which is involved in more than one function depending upon the plant. The role of Copper in metabolism of nodulated clover and found its effect to vary with the supply of combined nitrogen, when Copper was deficient, plants receiving nitrate-nitrogen accumulated amino-acids, where as plants relying upon symbiotic fixation of nitrogen showed a continuous increase in soluble amino acids correlated with the level of Copper (Loeppert and Suarez, 1996)

Zinc-Zn is one of the important trace element that play a vital role in the physiological and metabolic process of many organisms. Nevertheless, at higher concentration, Zinc can be toxic to the organisms. It utilize in Protein synthesis. For soil the concentration of Zn ranged between a minimum of 0.6 and a maximum of 1.4 mg/L (Khan 2007). An excess of Zinc in soil suppresses phosphorus uptake by plant and can causes leaf chlorosis. Zinc is widely distributed as the Sulphide, Sphalerite, the Carbonate, Smith–sonite, Silicate calamine, Hemimorphite and is associated with Pyrites, shortage of Zinc in a soil leads to a decrease in plant protein synthesis and a decrease in uptake of phosphorous and nitrogen, Manganese uptake is increases.[18] Adequate Zinc is absolutely necessary for the synthesis of Alanin, Glycin, Proline, Threonine,

Serine, Valine, Leucine, Aspartic acid, Glutamic acid and that it has a specific role in the synthesis of Tyropsine tryptophan and Phenylalanine (Andrew, et.al. 2012)

Maganese-Manganese occurs in primary and particularly in ferromagnesian rocks. By Solution from the rocks and subsequent redeposition manganese appears in several minerals, the most abundant of which is Pyrolusite MnO_2.. Another common mineral manganite MnO(OH), is found frequently in association with Granitic ignecious rocks and can change with time into Pyrolusite. IN soils we can distinguish water soluble exchangeable, reducible manganese. The nature and distribution of manganese in soils is largely dependent upon pH and redox Potential. (Hendershot, Lalande, and Duquette, 1993)

2. METHODOLOGY

The sampling point was detected with 100 meter distance of every selected sample spot i.e. Balco area of Korba city. Soil sample was collected from Balco in the sessions 2009. . Taking a core or slice of the plow layer at intervals of 15-20 steps. And put into bag. Slices of sample must be about 1 Kg which was taken from this as representative sample. Place the sample in water resistant paper bag. The depth of soil using aluminum foil label. For the purpose to find out the correlation among in between selected soil parameters i.e. moisture. pH, electrical conductivity, total dissolved solid, organic carbon contents, nitrogen contents, total sulphur, the experimental method was used to detect them in each collected sample.

3. RESULTS AND DISCUSSION

.Simple correlation analysis were carried out for all obtained data using the commercially available software package. The anlysis of data has been presented below in Table 1

TABLE 1

CORRELATION OF SOIL SAMPLE AT BALCO AREA IN KORBA CITY DURING 2009

Variables	Moisture	PH	EC	TDS	Org.C	N	S	Mg	Ca	Mn	Zn	Cu
Moisture	1	-0.259	-0.123	0.663	0.841	0.047	0.586	-0.136	-0.057	-0.301	-0.386	0.731
PH		1	0.183	0.209	0.010	0.719	0.169	0.164	0.148	0.488	0.307	0.488
EC			1	-0.043	-0.113	0.007	0.064	0.504	-0.318	-0.150	-0.124	0.024
TDS				1	0.842	0.638	0.762	-0.340	-0.252	-0.679	-0.144	0.351
Org.C					1	0.367	0.871	-0.224	-0.169	0.587	0.046	0.878
N						1	0.594	-0.188	-0.162	-0.707	0.164	-0.358
S							1	-0.184	-0.352	-0.694	0.085	0.372
Mg								1	-0.404	-0.003	0.005	-0.031
Ca									1	0.336	0.067	-0.014
Mn										1	-0.416	-0.134
Zn											1	-0.041
Cu												1

From above Table-1 shows the correlation matrix among the physical and chemical content together in soil sample of Balco area during 2009, which are explained below-

In case of Moisture, Strong correlation wad observed between moisture- OC (0.841). Moderate correlations were observed between moisure- TDS (0.643) followed by S (0.586) and Cu (0..731) The low degree correlation was seen in between Moisture--N(0.047). The negative

correlations were observed between moisture-pH (-0.2f9) followed by EC(-0.123), Mg(-0.136), Ca(-0.057), Mn(-0.301), and Zn(-0.386) in the soil of Balco region during 2009..

In case of pH, Moderate positive correlations were observed in between pH-N (0.719) followed by MN(0.488), ZN(0.307)_ and Cu (0.488) Low correlations were observed in between pH-EC (-0.642) followed byTDS(0.193), OC(0.209), N(0.169), S(0.164), Mn (0.148), Zn and Cu

In case of EC, Moderate positive correlation was observed in between EC-Mg(0.504). Negative correlations were observed between EC-OC (-0.043) followed byOC(-0.113), S(0.007) Mn(-0.150), Zn(-0.124), Cu (0.024) in soil sample during 2009.

In case of TDS, Strong correlations were observed in between TDS-OC(0.842) and S(0.763). Moderate correlations were observed in between TDS-N(0.638) followed by Mg (0.340), and Cu(0.321). in soil sample during 2009.

In case of Organic Contents, Strong correlations were observed in between OC-S(0.871) and Cu(0.878) Moderate correlations were observed in between OC-N(0.367) and Mn(0.587) in soil sample during 2009

.In case of N, Strong negatice correlation was observed in between N-Mn(-0.707). Moderate positive correlation was observed between N-S(0.594) only. Rest of the contents had negative correlations with Nitrogen in soil sample during 2009.

In case of S, Moderate positive correlation was observed in between S-Cu(0.372) only. Rest of the contents had negative correlations with sulpher in soil sample during 2009.

In case of Mg, Moderate negative correlation was observed in between Mg-Ca(-0.404) only Low correlations were observed in between Mg-Mn(-0.003) followed byZn (0.005) and Cu(-0.031) in soil sample during 2009

.In case of Ca, Moderate positive correlation was observed between Ca-Mn(0.336). Low correlation was observed in between Ca-Cu(0.067) and Ca-Cu(-0.014 in soil sample during 2009.

In case of Mn, Negative correlation were observed in between Mn-Zn(-0.416). Moderate negative correlation was observed in between Mn-Cu(-0.134) in soil sample during 2009.

In case of Zn, Low negative correlation was observed in between Zn-Cu(-0.041) in soil sample during 2009.

4. CONCLUSION

This study aims to investigate the correlation matrix of various physio-chemical parameters of soil in the Balco area of Korba city. The physio-chemical parameters under scrutiny encompass a broad spectrum, including but not limited to, pH, organic matter content, moisture content, texture, nutrient levels, and heavy metal concentrations. As a whole, it was concluded that the correlations in between physical and chemical parameter had the variation in the obtained value of correlation among parameter together . The study revealed the strong to low and positive to negative correlations together in between selected parameters to detect in the soil of Balco area of Korba city.

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